APPENDIX A

FEDERAL COORDINATION AND PLANNING

BASIS FOR FEDERAL COORDINATION PROCESS

In 1963, Congress and the Executive Office of the President expressed concern about the adequacy of coordination of Federal meteorological activities. In response, Congress directed in Section 304 of Public Law 87-843--the Appropriations Act for State, Justice, Commerce, and Related Agencies--that the Bureau of the Budget prepare an annual horizontal budget for all meteorological programs in the Federal agencies.

The Bureau of the Budget (now the Office of Management and Budget) issued a report entitled "Survey of Federal Meteorological Activities" (1963). The report described each agency's program in some detail, particularly its operational services, and detailed the relationship between the programs of the various agencies. The report revealed close cooperation but little evidence of systematic coordination. Based on this study, the Bureau of the Budget issued a set of ground rules to be followed in the coordination process. It established a permanent general philosophy for assignment and assessment of agency roles in the field of meteorology and set certain goals to be achieved by the coordination process. The Bureau of the Budget tasked the Department of Commerce (DOC) to establish the coordinating mechanism in concert with the other Federal agencies. It also reaffirmed the concept of having a central agency--the DOC--responsible for providing common meteorological facilities and services and clarified the responsibilities of other agencies for providing meteorological services specific to their own needs.

The implementation of these directives by DOC led to the creation of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) which operates with policy guidance from the Federal Committee for Meteorological Services and Supporting Research. The principal work in the coordination of meteorological activities and in the preparation and maintenance of Federal plans is accomplished by the OFCM staff with the advice and assistance of the Interdepartmental Committee for Meteorological Services and Supporting Research, and over 30 program councils, committees, working groups, and joint action groups.

MISSION OF THE OFFICE OF THE FEDERAL COORDINATOR FOR METEOROLOGY (OFCM)

The mission of the OFCM is to ensure the effective use of Federal meteorological resources by leading the systematic coordination of operational weather requirements, services, and supporting research, among the Federal agencies. The high level focus and output as a result of carrying out this mission includes needs and requirements; issues and problems; studies, reports, plans, and handbooks; and crosscut reviews, assessments, and analyses.

OFCM's objectives in carrying out its mission include:

- Documenting agency programs and activities in a series of national plans and reports that enable agencies to revise/adjust their individual ongoing programs and provide a means for communicating new ideas and approaches to fulfill requirements.
- Providing structure and programs to promote continuity in the development and coordination of interagency plans and procedures for meteorological services and supporting research activities.
- Preparing analyses, summaries, or evaluations of agency meteorological programs and plans that provide a factual basis for the Executive and Legislative branches to make appropriate decisions related to the allocation of funds.
- Reviewing Federal weather programs and Federal requirements for meteorological services and supporting research. This review may suggest additions or revisions to current or proposed programs, or identify opportunities for improved efficiency, reliability, or cost avoidance through coordinated actions or integrated programs.

As detailed in the report which follows, this has been an excellent year for OFCM in carrying out its interagency activities. The accomplishments of FY06 were substantial and meaningful for the nation, and the foundation has been placed for a similarly productive FY07.

FEDERAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

The Federal Committee for Meteorological Services and Supporting Research (FCMSSR), established in 1964, provides policy-level agency representation and guidance to the Federal Coordinator to address agency priorities, requirements, and issues related to services, operations, and supporting research, and also resolves agency differences that arise during the coordination of meteorological activities and the preparation of Federal plans. The Under Secretary of Commerce for Oceans and Atmosphere, who is also the Administrator of the National Oceanic and Atmospheric Administration (NOAA), serves as the FCMSSR Chairperson.

The 15 Federal agencies that engage in meteorological activities, or have a need for meteorological services, are represented on FCMSSR. The FCMSSR membership includes: DOC, DOD, DOT, the Departments of Agriculture (USDA), Energy (DOE), Homeland Security (DHS), Interior (DOI), and State (DOS), the Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Transportation Safety Board (NTSB), Nuclear Regulatory Commission (NRC), the Office of Science and Technology Policy (OSTP), and the Office of Management and Budget (OMB).

HIGHLIGHTS FOR FISCAL YEAR 2006 AND PLANS FOR FISCAL YEAR 2007

NATURAL DISASTER REDUCTION

INTERDEPARTMENTAL HURRICANE CONFERENCE

The OFCM annually hosts the Interdepartmental Hurricane Conference (IHC) to provide a forum for the responsible federal agencies, together with representatives of the user communities such as emergency management, to review the nation's hurricane forecast and warning program and to make recommendations on how to improve the program. The OFCM hosted the 60th IHC in Mobile, Alabama, March 20-24, 2006. The theme of the 2006 conference was *Hurricane Season 2006: Building on the Historic 2005 Season*. The conference attendance was more than 240; for the seventh consecutive year, attendance has exceeded 200. VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration (NOAA), set the tone for the meeting during his Monday afternoon keynote address-Power of Partnerships: Prediction and Protection, noting that the only way to protect lives, property, and the economic well-being of our citizens is through partnerships. As a result, the importance of building partnerships became the central theme of the conference which the attendees took to heart. Objectives of the 2006 IHC included the following: review the nation's tropical cyclone forecast and warning program from end-to-end and update the *National Hurricane Operations Plan for 2006*; evaluate lessons learned from the 2005 hurricane season, with a focus on Hurricanes Dennis, Katrina, Rita, and Wilma; examine the results of the Joint Hurricane Test Bed (JHT) as a model for transitioning successful research results into operations; review the federal priorities for tropical cyclone research and development for the next decade, to include relevant social science issues; examine the needs and requirements for future tropical cyclone surveillance and reconnaissance observations; and evaluate changes in forecast and warning messages needed to improve public awareness, preparedness, and response. The IHC once again proved to be an extremely valuable forum to bring the operational and research communities together to produce the best possible tropical cyclone forecast and warning program, and to address the needs of the federal agencies and user communities that have a stake in the nation's tropical cyclone program. Actions resulting from the conference are: (1) publish the *2006 National Hurricane Operations Plan*; (2) through the Joint Action Group for Tropical Cyclone Research (JAG/TCR), further refine the draft strategic research plan for tropical cyclones based on the input received during the 60th IHC workshop; (3) develop a Strategic Plan for Improved Tropical Cyclone Reconnaissance Systems (ITCRS) (manned, unmanned, space-based, etc.); (4) facilitate bringing together the Web site owners from NOAA (e.g., Hurricane Research Division, National Hurricane Center), Navy, etc., to improve linkages for supporting research and development; and (5) adopt recommendations for action in a comprehensive effort to improve *getting the "right" message to the customer*. In May 2006, the 44th edition of the *National Hurricane Operations Plan (NHOP)*, which provides the basis for hurricane reconnaissance for the 2006 season and details federal agency responsibilities, operations, and procedures; products; aircraft, satellite, radar, and buoy data collection; and marine weather broad-

casts, was published based on the inputs and discussions from the 60th IHC. The comprehensive NHOP was critical to ensuring successful weather and reconnaissance operations for the 2006 hurricane season. The 2007 IHC is being planned for New Orleans, Louisiana.

TROPICAL CYCLONE RESEARCH AND DEVELOPMENT PLAN

Actions from previous meetings of the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and Interdepartmental Hurricane Conferences (IHC) called for the preparation of a tropical cyclone strategic research plan. This is being accomplished by the OFCM Joint Action Group for Tropical Cyclone Research (JAG/TCR). JAG/TCR had available results from numerous past efforts which have outlined the tropical cyclone community's priorities and strategies which were vetted through many meetings and workshops. Examples of these, which detailed research challenges and priorities, operational needs, gaps, and potential solutions, include the U.S. Weather Research Program (landfalling hurricanes and Joint Hurricane Testbed), OFCM-sponsored Interdepartmental Hurricane Conferences, two Hurricane Weather Research and Forecasting (HWRF) model workshops, and activities of NOAA's National Weather Service and Office of Oceanic and Atmospheric Research. In addition, the tropical cyclone research workshop held in March 2006 at the 60th IHC, reviewed ongoing efforts of three complementary hurricane research projects. These included the NOAA Science Advisory Board (SAB) Hurricane Intensity Research Working Group (HIRWG), the National Science Foundation (NSF) National Science Board's (NSB) Task Force on Hurricane Science and Engineering (HSE), and the OFCM Joint Action Group for Tropical Cyclone Research which is preparing the document, *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*. The plan notes that overarching tropical cyclone priorities that need further improvement are intensity and structure; track; other impacts (sea state, storm surge, precipitation, inland flooding); social science research and results; and intraseasonal and interannual variability. More specific examples of research priorities were identified as the role of inner core processes for intensification and weakening (e.g., eyewall replacement cycles, mixing); role of the ocean and oceanic heat content; value of high-resolution deterministic forecasts vs. ensembles; consideration of the extent to which the public understands terms such as "hurricane watch" and "hurricane warning" and whether these terms best convey these concepts; and consideration of how probabilistic forecasts can be structured to promote public understanding. OFCM will publish the *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead* in fall 2006. It will then focus on development of a *Strategic Plan for Improved Tropical Cyclone Reconnaissance Systems* (manned, unmanned, space-based, etc.).

NATIONAL HURRICANE CONFERENCE

OFCM participated in the 28th Annual National Hurricane Conference (NHC) in Orlando, Florida, April 10-14, 2006. The NHC is the nation's forum for education and professional training in hurricane preparedness. The primary goal of the NHC is to improve hurricane preparedness, response, recovery, and mitigation in order to save lives and property in the United States and the tropical islands of the Caribbean and the Pacific. In addition, the conference serves as a national forum for federal, state, and local officials to exchange ideas and recommend new policies to improve emergency management. On April 11, OFCM conducted a training session in conjunction with the conference. The theme of the training session was *Warning Messages: Improving Response*. The training session focused on hurricane messages and communication, and introduced a new proposed communications model that reflects the divergent information needs of various users. Included in the session was a review of recent social science research results, pertaining to hurricane response and, just as important, specific recommendations emergency managers and decision makers can use to improve hurricane response. Approximately 200 conference attendees participated in the training session, which validated the need to revisit the warning process. It was noted that messages, resulting in appropriate response, must come from credible sources, must be received, must be understood, must have personal meaning, should include action statements, often require confirmation, and are only successful if appropriate responses are possible. It was also emphasized that the results of social science research need to be an integral part of the hurricane forecast and warning program.

POST-STORM DATA ACQUISITION

The OFCM continued to coordinate, as required, timely post-storm data acquisition surveys in response to Presidentially declared natural disasters and other agency requirements to evaluate, for example, the impact on the coastal ecosystems. These natural disaster reduction efforts contribute to the determination of the intensity and magnitude of storms, and, in many cases, help to determine the extent of damage for use in Presidential disaster declarations. The additional data collected after hurricane landfall is also used in validating modeling efforts with both emergency management models (e.g., FEMA's HAZUS) and

hurricane storm-surge models (e.g., NOAA's SLOSH). These models are used in real time to assist decision makers in evacuation decisions and procedures. Post-storm data are also used to update FEMA Flood Insurance Rate Maps. In FY 2006, post-storm surveys were conducted for Hurricane Rita and after the April 7, 2006, tornado outbreak in central Tennessee.

URBAN METEOROLOGY

NATIONAL WILDLAND FIRE WEATHER NEEDS ASSESSMENT

An important contribution to urban meteorology during the period of this report is related to the National Wildland Fire Weather Needs Assessment which is being conducted by OFCM. The formation of the Joint Action Group for National Wildland Fire Weather Needs Assessment (JAG/NWFWNA) and conduct of the assessment is responsive to ICMSSR Action Item 2005-1.1 where ICMSSR "concurred that OFCM should move forward to form a Joint Action Group (JAG) under the Committee for Environmental Services, Operations, and Research Needs (CESORN), to review the needs and requirements for wildland fire weather information, to include identifying organizational responsibilities and addressing the following issues: data collection, fire weather research, weather forecast services, data assimilation, air quality, information dissemination, education and outreach, and user response." An abundance of accumulated biomass in forests and rangelands, persistent drought conditions, and encroaching urbanization are contributing to larger, more costly wildland fires; and to effectively manage and suppress wildland fires, fire managers need timely, accurate, and detailed fire weather and climate information. As examples, the 2003 wildland fires in southern California claimed 22 lives, destroyed 3,600 homes, burned 740,000 acres of land, and caused over $2 billion in property damage; and the grassland fires this year in Texas by June 1st had claimed 11 lives, destroyed 440 homes, and burned over 5 million acres. Another example is the fires in southern California in mid-July, which were started by lightning, and enhanced by dry conditions (drought) and fanned by strong winds. On June 22, 2006, California Governor Schwarzenegger signed an Executive Order to expand statewide firefighting efforts and called on Californians to take common sense fire prevention measures. An important benchmark is the June 2005 Western Governors' Association (WGA) meeting where they approved Policy Resolution 05-04: National Wildland Fire Weather Program. Within the policy, the WGA urged NOAA to have the OFCM complete a National Needs Assessment Report of federal, state, and local fire managers' needs for weather information in their wildfire and prescribed fire decision making processes and a framework to meet those needs by the National Weather Service and Predictive Services. The JAG/NWFWNA was established in December 2005 and has moved forward to conduct the assessment. Preliminary findings have been obtained in several areas including federal agency reactions, education and outreach, atmospheric and meteorological research concerns, user and stakeholder initial response, and social science aspects. Next steps include the interim assessment report (early results) to be completed in the fall of 2006; an OFCM Special Session on wildland fire weather and climate use in decision making at the 3rd International Fire and Ecology Congress, November 14, 2006, in San Diego, California; briefing to the Interdepartmental Committee for Meteorological Services and Supporting Research; continuing the fact survey effort; and the final product available during the spring 2007 which will be used to support the 2007 WGA conference.

ATMOSPHERIC TRANSPORT AND DIFFUSION RESEARCH AND DEVELOPMENT

OFCM developed an atmospheric transport and diffusion (ATD) implementation strategy for the recommendations for which OFCM has primary responsibility in the *Federal Research Needs and Priorities for Atmospheric Transport and Diffusion Modeling* (September 2004) report. The implementation strategy has three parts: (1) working with the agencies to identify and improve a baseline set of national ATD modeling capabilities; (2) helping the agencies implement a common framework for model development and evaluation; and (3) recommending criteria for multifunctional joint urban test beds ["urban" describes a metropolitan area and its interfaces with surrounding areas]. In accordance with this, OFCM formed a Joint Action Group for the Joint Urban Test Beds (JAG/JUTB) under the Working Group for Urban Meteorology (WG/UM); and this joint action group met January 24, March 1-2, and June 15, 2006, and is continuing work to develop an operational concept document for multifunctional joint urban test beds to provide services and data to model developers, test and evaluation personnel, and users. The joint urban test beds will support the following functional areas: severe weather (e.g., hurricanes, tornadoes, heat waves and cold spells, drought, and wildland fires), homeland security (dispersion of hazardous materials), climate, air quality (e.g., particulate matter aerosols), and water quality (e.g., deposition of airborne contaminants on water sources and waterborne transport of contaminants).

GEORGE MASON UNIVERSITY ATMOSPHERIC TRANSPORT AND DISPERSION MODELING CONFERENCE

George Mason University (GMU),

Fairfax, Virginia, conducted its 10th Annual Conference on Atmospheric Transport and Dispersion Modeling, August 1-3, 2006. The OFCM cosponsored the event, together with the Joint Science and Technology Office for Chemical and Biological Defense, Defense Threat Reduction Agency (DTRA); the Naval Surface Warfare Center, Dahlgren Division (NSWCDD); and George Mason University. Technical topics of interest for the conference were: new developments in basic theories of boundary layer models and transport and dispersion models; urban-scale meteorological and dispersion experiments and models; computational fluid dynamics (CFD) model theory and applications; field experiments and laboratory experiments concerned with boundary layer studies and turbulence and dispersion studies; mesoscale meteorological modeling for input to transport and dispersion models; the use of remote sensing technology in boundary layer and transport and dispersion studies; model evaluation methods, uncertainty/sensitivity analyses, and risk assessments; improvements in model inputs (e.g., land-use data, 3-D building data) and output visualizations; and methods and criteria for emergency response and decision making.

The OFCM conducted a special session related to the OFCM's ongoing work with other members of the federal meteorological community to implement the recommendations in the report, *Federal Research Needs and Priorities for Atmospheric Transport and Diffusion Modeling*. The special session provided much information on joint urban test beds, including the history and status of the joint urban test bed effort, the importance of user involvement, the importance of test beds for air quality and for regulatory work done by the Environmental Protection Agency, the efforts of the Centers for Disease Control and Prevention to monitor health impacts, the needs of emergency managers and responders, research perspectives, data management needs, and the importance of more complete understanding of weather in the urban environment.

CLIMATE

OFCM supports the U.S. Climate Change Science Program (CCSP). OFCM arranged for Dr. James R. Mahoney, former Director of the CCSP, to brief the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) so that member agencies can stay abreast of the program and coordinate priorities for atmospheric requirements through OFCM for inclusion in CCSP. Further, OFCM used its infrastructure to reach out and invite many government, private, and academic individuals to attend the November 14-16, 2005, *CCSP Climate Science in Support of Decision Making* workshop, and this resulted in substantially increased attendance of the workshop; and OFCM provided interagency funding support for an evening poster session of the workshop. OFCM also prepared results of a Climate Services Survey to identify new climate products and services that have been developed and implemented since the Board on Atmospheric Sciences and Climate defined "climate services" in 2001 as "the timely production and delivery of useful climate data, information, and knowledge to decision makers." This definition was adopted by Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) agencies. The results of the survey were forwarded to the Director of the CCSP just prior to the beginning of FY 2006. And the Federal Coordinator, through his participation on the Committee on Environment and Natural Resources (CENR), reviewed and commented on and provided concurrence with the U.S. CCSP Synthesis and Assessment Product 1.1, *Temperature Trends in the Lower Atmosphere-Steps for Understanding and Reconciling Differences*, a report by the U.S. CCSP and the CENR Subcommittee on Global Change Research (SGCR).

OPERATIONAL PROCESSING

OFCM's activities regarding Operational Processing Centers (OPC) continue opportunities to improve processing and backup capabilities of NOAA's National Centers for Environmental Prediction and Office of Satellite Data Processing and Distribution, the Air Force Weather Agency, and the U.S. Navy's Fleet Numerical Meteorology and Oceanography Center and Naval Oceanographic Office. Efforts continue to improve backup support and capabilities and to coordinate preparation for the implementation of the Weather Research and Forecasting (WRF) modeling system, in accordance with the *National Concept of Operations Framework for the Operational Processing Centers*, which is contained in an April 1, 2004, memorandum of agreement signed by the directors of the OPC's. Of particular significance during this period is the establishment of a National Operational Processing Centers (NOPC) Program Council within the OFCM coordinating infrastructure, to help achieve national priorities by focusing agency efforts and leverage resources to gain the maximum return. This was in response to the OPC Directors' determination that effectively coordinating the OPCs' efforts and providing the resources to support those efforts necessitated high-level policy guidance and oversight. OFCM's previously existing Committee for Operational Processing Centers (COPC) and its Working Group for Cooperative Support and Backup (WG/CSAB) and joint action groups for operational community modeling, centralized communications management, and operational data acquisition for assimilation, were placed under the new NOPC Program Council.

ANNUAL FEDERAL PLAN

In October 2005, the OFCM issued *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2006*. The Federal Plan is congressionally mandated and is a one-of-a-kind document which articulates the meteorological services provided and supporting research conducted by agencies of the federal government. The Federal Plan helps to reduce overlap and duplication among the agencies. It is a comprehensive publication that documents proposed programs for FY 2006 and reviews agency programs in FY 2005. The feature article for the FY 2006 Annual Federal Plan focuses on the federal agencies' meteorological activities related to minimizing the impact of wildland fires on the urban environment; its title is *Living with Wildland Fire in the Urban Environment*. The article summarizes the causes of wildland fires, describes their impacts on urban communities, reviews some activities undertaken by federal agencies to minimize the impacts, and recommends next steps to address these impacts effectively. The feature article for the FY 2007 Annual Federal Plan focuses on tropical cyclone research.

WEATHER INFORMATION FOR SURFACE TRANSPORTATION

Since 1998, OFCM has made weather services and research and development (R&D) activities supporting the surface transportation community a priority for the federal meteorological community. In December 2002, OFCM published the comprehensive report, *Weather Information for Surface Transportation-National Needs Assessment Report*, which provides the first ever compilation and analysis of weather support needs across six surface transportation sectors (roadway, railway, transit, marine transportation, pipeline systems, and airport ground operations). In August 2004, OFCM established the Working Group for Weather Information for Surface Transportation (WG/WIST) to develop both a WIST R&D Plan and a WIST Implementation Plan. More recently, OFCM conducted two WIST workshops June 6-7 and June 13-14, 2006, with the objectives to: (1) help determine the priorities for the surface transportation weather information research needed to provide improved weather information and services to the surface transportation community; (2) gather and crossfeed information concerning ongoing or planned (next 3 years) surface transportation weather-related research and development; and (3) hear from workshop attendees on what they see as a vision (3-10+ years) on how weather information will be used to optimize surface transportation operations and safety, and what specific hurdles must be overcome to reach such a vision. Information from these workshops is being reviewed and organized to support continued progress in this important area, which will lead to the WIST R&D Plan and WIST Implementation Plan mentioned above. During the period of this report, OFCM also attended the National Research Council Transportation Research Board (TRB) 85th Annual Meeting in Washington, D.C., January 22-26, 2006; provided a WIST presentation at the 86th American Meteorological Society (AMS) Annual Meeting, Atlanta, Georgia (January 29 - February 2, 2006); and attended the Intelligent Transportation Society of America (ITS-A) 2006 Annual Meeting and Exposition in Philadelphia, Pennsylvania (May 7-9, 2006). And in August 2006, OFCM published the report, *Weather Information for Surface Transportation-Update on Weather Impacts and WIST Results*. This update focuses on the status of transportation weather issues in the nation and the results achieved since the first WIST report in 2002. It also highlights areas where further steps can be made in the near term. When statewide transportation incident reporting systems are implemented, we will be able to monitor, assess, and manage transportation weather risks, as well as evaluate the benefits of WIST-informed transportation decisions. R&D programs are in progress to improve warnings and decision support systems, implement weather-responsive traffic management in communities, and provide the observational support necessary for location-specific WIST.

AVIATION WEATHER

A project which is underway in the area of aviation weather support includes the development of The *National Volcanic Ash Operations Plan for Aviation and Support of the International Civil Aviation Organization International Airways Volcano Watch (NVOPA)*. This plan, projected be completed in the fall of 2006, is the national operations plan in support of observing, tracking, monitoring, forecasting and reporting volcanic ash in the atmosphere that affects the safety of flight operations in the U.S. National Airspace System (NAS). It identifies the federal agencies that implement these actions and describes their responsibilities, procedures, actions, and message formats. It also provides information on how the Federal Aviation Administration (FAA) meets its obligations to the International Airways Volcano Watch, sponsored by the International Civil Aviation Organization. Participating agencies include, in addition to FAA, the Department of Commerce National Oceanic and Atmospheric Administration's National Environmental Satellite, Data, and Information Service, the National Weather Service, and the Office of Oceanic and Atmospheric Research; the Department of Defense U.S. Air Force; and the Department of Interior's U.S. Geological Survey. The National Aeronautics and Space Administration (NASA) and the

Smithsonian Institution also provide support to the federal agencies through extending the benefits of earth science research in the areas of volcanic ash monitoring and tracking.

The OFCM continues to facilitate the continuation of interagency funding for the acquisition of automated meteorological observations from aircraft in partnership with several major U.S. commercial airlines.

The OFCM attended the National Business Aviation Association, Inc., and Friends and Partners in Aviation Weather Annual Meeting and the FAA's Aviation Weather Technology Transfer meeting held in Orlando, Florida, in November 2005. OFCM also participated in the NASA Weather Accident Prevention project review in September 2005, and continued to implement the National Aviation Weather Program during FY 2006. The federal interagency National Aviation Weather Program has resulted in a major reduction of weather-related accidents. The program remains on track toward meeting the established goal to reduce weather-related accidents by 80 percent by 2007. The OFCM continues to monitor progress in meeting this goal by monitoring weather-related aviation accident events and trends. *A National Aviation Weather Program Mid-Course Assessment* was completed in August 2003. OFCM will complete a final assessment in 2007, the ten year point of the National Aviation Weather Program.

The OFCM continues to implement the National Aviation Weather Program. OFCM is a member of the executive council of the interagency Joint Planning and Development Office Weather Integrated Product Team, and has monitored the early development of the Next Generation Air Transportation System concept of operations with special emphasis on how weather support will be integrated into the concept of operations for the overall NAS 2025.

SPACE WEATHER

It was noted at the November 16, 2004, and December 1, 2004, meetings of the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and Federal Committee for Meteorological Services and Supporting Research (FCMSSR), respectively, that the National Space Weather Program (NSWP) was nearing the end of its 10-year period to accomplish its overarching goal to achieve an active, synergistic, interagency system; providing timely, accurate, and reliable space weather warnings, observations, specifications, and forecasts by 2007. It was also noted that it was time to perform an interagency assessment to look at the progress toward meeting its goals. A National Space Weather Program Assessment Committee was formed by OFCM to perform the assessment, which was led by Dr. Louis J. Lanzerotti, Distinguished Research Professor, Center for Solar-Terrestrial Research, New Jersey Institute of Technology. The charge to the Assessment Committee was to review the NSWP to quantify and document the progress toward meeting the NSWP stated goals in observations, research, modeling, transition of research to operations, and education and outreach; to see if the program is still on target and moving in the direction pointed to by the Strategic Plan; to determine whether the strategic goals should be adjusted at this time based on emerging/evolving requirements; and to suggest a way ahead which will form a basis for a new strategic plan covering the next 10 years. The committee's activities in conducting the assessment included briefings at OFCM; visits to the National Security Space Office, National Reconnaissance Office, NOAA's Space Environment Center, U.S. Geological Survey, Air Force Space Command, Air Force Weather Agency, Air Force Space Weather Operations, STRATCOM, and Air Force Research Laboratory; community and user questionnaires; and issuance of a September 2005 interim report. Important reference sources were the *National Security Space Architecture 2000: Space Weather Architecture*; U.S. Department of Commerce Service Assessment, April 2004; and the National Academies report, *The Sun to the Earth-and Beyond: A Decadal Research Strategy in Solar and Space Physics*, 2002.

In its *Report of the Assessment Committee for the National Space Weather Program* (June 2006), the Assessment Committee concluded that, since the program's inception in 1995, it has had a number of noteworthy achievements, most of which likely would not have been attained without the program's existence. The committee also found shortfalls in the program. Based on the conclusions of the committee as contained in the report, continuation of the NSWP is strongly warranted because of the enormous potential to enhance the nation's space weather mission over the next 10 years through improved operational capabilities, which capitalize on the transition of innovative research. Moving NOAA's operational space weather prediction center (i.e., the Space Environment Center) from its research organization to the National Weather Service was a positive step to improve operational focus within the NSWP. The committee made specific recommendations to further strengthen the NSWP in four key areas. The critical findings and recommendations to strengthen the NSWP are:

1. To centralize program management, set national funding priorities, and increase the effectiveness of the NSWP:

- Establish a space weather expert as the permanent Executive Secretary to the Committee for Space Weather under the National Space Weather Program Council.

• Establish a focal point for the program in the Office of Science and Technology Policy (OSTP)/Office of Management and Budget (OMB).

• Create a joint, cross-agency, space weather organization, the "Center for Space Weather Research to Operations."

2. For continuity of data sources critical to space weather forecasts and operations:

• Develop and execute strategy and funding for L1 sensor continuity.

• Maintain critical ground-based assets such as USGS magnetic observatories.

3. To strengthen the science-to-user chain:

• Maintain and strengthen both targeted and strategic space weather research.

• Enhance emphasis and resources for transition of models to operational users.

• Increase the private sector role in supplying products and services.

4. To emphasize public and user awareness of space weather for critical national needs:

• Quantify the national benefits that arise from the NSWP.

• Enhance academic and professional education programs for new space weather professionals.

It was agreed that the *Report of the Assessment Committee for the National Space Weather Program* should proceed for consideration by the National Space Weather Program Council (NSWPC), and that the Program Council should be the executive agent for FCMSSR for continuing activities in this area. And, at its July 19, 2006, NSWPC meeting, Action Item 2006-1.1 was agreed to stating "The National Space Weather Program Council (NSWPC) accepted the report as an extremely important resource in moving the National Space Weather Program (NSWP) forward over the next 10 years and tasked the Committee for Space Weather (CSW) to prepare new strategic and implementation plans that stress the importance of improving our operational capabilities to provide space weather products and services with the support of a viable research program and an effective mechanism to transition proven research results into operations." Additional action items were approved concerning OFCM investigation of oversight of the NSWP in the Office of Science and Technology Policy (OSTP) and in the Office of Management and Budget (OMB), and the possibility of establishing a joint working group for all cooperating NSWP agencies similar to that described for NASA and NOAA in the NASA Authorization Act of 2005, Section 306; and identification of report recommendations that the CSW can move forward on right away, agency specific recommendations, and recommendations that require more study.

The OFCM also participated in Space Weather Week April 25-28, 2006, in Boulder, Colorado. Space Weather Week was sponsored by NOAA Space Environment Center and partners, and is for users and researchers interested in space weather.

PHASED ARRAY RADAR

The OFCM Joint Action Group for Phased Array Radar Project (JAG/PARP) recently completed the report, *Federal Research and Development Needs and Priorities for Phased Array Radar* (June 2006). It is responsive to ICMSSR Action Item 2004-2.3 where ICMSSR supported the joint action group's "continued work to identify and document the potential needs and benefits that phased array radar and an adaptive radar sensing strategy would address, and to integrate those identified needs into a multiagency-coordinated R&D plan that would focus R&D efforts on meeting each agency's need." In the MPAR national vision, the National Radar Network will be the critical observing system supporting public safety, homeland security, and the transportation sector for decades to come; there is a need to replace the aging fleet of 526 conventional mechanically scanning radars over the next 20 years with 300+ MPAR radars; MPAR can provide simultaneous air and weather surveillance from a single radar site; and with the consolidation of multiple single-mission radars into MPAR we can reduce the national radar fleet by more than 40 percent. The scalable (modular construction) MPAR can perform weather surveillance, aircraft tracking, non-cooperative aircraft tracking, and other specialized functions. The JAG/PARP has determined that MPAR has the potential to exceed present radar capabilities and meet stated user needs; there would be a significant increase in tornado lead times; there are no serious hardware technical challenges; and a 7- to 10-year intensive research and development effort will be required, and the estimated cost of this is $200 million. The lifecycle cost savings of the MPAR over the 526 conventional radars, would be $5 billion. MPAR's potential improvements include: agile beam-forming allows multi-function applications for optimum weather, aircraft surveillance, as well as specialized functions such as tracking chemical/biological plumes, volcanic ash, birds, wildfire debris, etc.; improved coverage in the boundary layer and clutter suppression; capability to perform intensive radar interrogation ("staring") simultaneously with all-sector surveillance; rapid refresh rate-improved spatial and temporal resolution, especially of severe weather events; and graceful degradation, greater system reliability, and simplified logistics. The report *Federal Research and Development Needs and Priorities for Phased Array Radar* estimated needed research and development funding to be $215 million over 9 years to meet the replacement

opportunity. This would support the research needed to reduce risk, determine the capability of MPAR to meet multiple user needs concurrently, develop a full MPAR prototype, and perform a cost analysis to determine system affordability. Delays in performing the necessary MPAR research, development, and testing may mean missed opportunity to replace legacy radars. At its July 18, 2006, meeting, ICMSSR decided that an MPAR interagency working group should be established within the OFCM infrastructure with a defined charter to develop a strategy to address the key findings and recommended next steps in the MPAR report, and agency comments from the ICMSSR meeting.

ATMOSPHERIC RESEARCH AND DATA ASSIMILATION/DATA MANAGEMENT

Advances in data assimilation are key to meeting virtually any forecast goal relating to model performance. It was stated in the *Strategic Plan for the U.S. Integrated Earth Observation System* (April 2005) that "In order to take the 'pulse of the planet,' we must establish a valid end-to-end process that will take us from observations to user-related products. Scientific needs for this end-to-end process require that we … assimilate the Earth observation data streams into models (eventually in real time) …" and "Data assimilation may be the most critical path through which advances in forecasting convective precipitation will be modulated." At its November 16, 2004, meeting, the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) supported action to examine gaps in data assimilation and data management capability, articulate challenges that lie ahead in meeting future requirements, and propose strategy to address gaps in capability and future challenges. And Action Item 2004-1.2 from the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) December 1, 2004, meeting, recommended that: FCMSSR agencies will support R&D needs and requirements based on agency priorities and will continue to identify issues and concerns that are necessary for the development of capabilities required to realize societal benefits; federal requirements and capabilities in key areas like data assimilation need to be surveyed and further addressed; and FCMSSR agencies will support and facilitate opportunities for the transition of research into operational applications.

The data assimilation survey and follow-on strategy was briefed at the July 18, 2006, ICMSSR meeting. It was noted that the focus of the report which is being prepared is on data assimilation for the purpose of improving forecast skill of a numerical weather prediction (NWP) model; the scope of data assimilation is restricted to incorporation of observational data as a forcing factor in cycles of forward NWP models; and broader definition of data assimilation would be addressed through inclusion of related activities such as climate reanalysis, trace constituent monitoring, and air quality. Key data assimilation issues are:

- Data delivery and standard formatting.
- How best to evolve assimilation techniques over time to meet future application challenges.
- Early delivery of new instrument data.
- Testing and transitioning new data assimilation techniques and concepts into "hardened" data assimilation instruments for operational use.
- Impact of the national shortfall in high performance computing and support for trained personnel on meteorological data assimilation and modeling.
- Data staging and delivery required for Global Earth Observation System of Systems (GEOSS)-level infrastructure capability.
- Education and public outreach: implications for data assimilation and modeling.
- Funding issues.

Data gathering and data assimilation activity analysis tasks are essentially complete; the report framework and key issues have been defined by the data assimilation group; and next steps are being defined. The report, *Federal Meteorological Data Assimilation Capabilities*, will be published in the fall of 2006, and this item will be briefed to FCMSSR around that time.

ENVIRONMENTAL LITERACY

OFCM has laid out a vision, framework, and methodology which the office will embrace to systematically promote and execute environmental literacy through interdepartmental collaboration within the OFCM coordinating infrastructure. The methodology defines how to determine if an opportunity to promote environmental literacy exists. It also describes the method to be used to determine the target public, private, and/or academic sector audiences and how to reach them. Determining the target audiences' needs and a means for assessing how those needs are being met is incorporated into the methodology as well. Executing this methodology will result in a nation better able to understand the linkages between weather and climate and personal and professional choices and build a national capacity to solve problems and respond to change. It will provide for a more environmentally literate citizenry. In this regard, the OFCM developed an implementing strategy/action plan to make environmental literacy a crosscutting priority within the OFCM coordinating infrastructure. *An Implementing Strategy for Promoting Environmental Literacy as an OFCM Crosscutting Priority* was presented to the science community at the American Geophysical

Union (AGU) Fall Meeting, December 5-9, 2005, in San Francisco, California. OFCM is also making environmental literacy an important part of the National Wildland Fire Weather Needs Assessment discussed earlier in this report. OFCM will also continue its support of an American Meteorological Society undergraduate scholarship in the atmospheric and related oceanic and hydrologic sciences.

FREQUENCY MANAGEMENT

Both international and domestic spectrum policy are of critical importance to the federal meteorological community and can significantly impact our ability to carry out our assigned duties and responsibilities. The OFCM Working Group for Frequency (Radio Spectrum) Management (WG/FM) acts as a two-way clearinghouse for information on environmental use of the radio spectrum. It fosters cooperation and coordination among federal agencies for the collection and consolidation of agency needs and requirements related to frequency management issues as they affect meteorological services, and planned non-environmental spectrum uses that may affect the environmental community for good or ill. During the first quarter of FY 2006, OFCM updated its frequency management issues document to provide the interagency community with background information, current status of meteorological uses, potential future technology that could impact spectrum bandwidth, identification of other new frequency management issues, and recommendations for agency involvement in the radio spectrum area. WG/FM met October 28, 2005, at which time the members approved and discussed future updates to the frequency management issues document, and reviewed the Office of Radio Frequency Management (ORFM) role and the NOAA/DOC spectrum plan. A particular issue which has arisen concerns possible interference of radiosonde operations with medical implants within the human body. In May 2006, OFCM placed on its Web site information on this subject for the frequency management community.

GUIDANCE AND PRACTICES FOR XML

The recently formed Committee for Environmental Information Systems and Communications (CEISC) Joint Action Group for Extensible Markup Language and Web Services (JAG/XMLWS) reviewed the members' current Meteorological and Oceanographic (METOC) XML implementations and agreed to use DOD's Joint METOC Broker Language (JMBL) as a starting point for a U.S. position. A *Report on the use of XML within the U.S.* was presented to the Expert Team on Data Representation and Codes (ET/DR&C) at its meeting May 8-12, 2006. ET/DR&C is currently tasked by World Meteorological Organization's (WMO) Commission for Basic Systems (CBS) to develop XML guidance, practices, and any associated WMO standards for the representation and delivery of meteorological information using XML. The ET/DR&C recommended that CBS create a new Expert Team to tackle the XML standardization issue. Assuming that CBS approves the recommendation when they meet in November 2006, the U.S. could then nominate our own experts, perhaps from the JAG/XMLWS to participate in the development of an XML standard.

COLLABORATION WITH NAS/NRC BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE

The OFCM continued its mutually beneficial interactions with the National Academy of Sciences/National Research Council (NAS/NRC). The NAS/NRC Board on Atmospheric Sciences and Climate (BASC) conducted a strategic planning workshop on August 8-9, 2006, in which the Federal Coordinator for Meteorology participated. The workshop was held at the J. Erik Jonsson Woods Hole Center of the National Academy of Sciences in Woods Hole, Massachusetts. The purposes of the meeting were to identify emerging issues facing the atmospheric sciences and climate communities, and to discuss future goals of BASC and set priorities for action. Emerging issues were examined in meteorology, weather, atmospheric composition and other areas relevant to the BASC mission. A balance was achieved in considering issues in basic and applied science, and policy; varied disciplines and interdisciplinary areas; and technology as well as research.

COLLABORATION WITH THE COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

CENR PRINCIPALS

The Federal Coordinator continued to be a participant on the CENR, and continued to assist CENR through review and concurrence of CENR reports and materials. Since the last ICMSSR meeting, these included: (1) the U.S. CCSP Synthesis and Assessment Product 1.1, *Temperature Trends in the Lower Atmosphere-Steps for Understanding and Reconciling Differences*, a report by the U.S. CCSP and the CENR Subcommittee on Global Change Research (SGCR), (2) *Grand Challenges for Disaster Reduction Implementation Plans*, authored by the CENR Subcommittee on Disaster Reduction (SDR), (3) United States Group on Earth Observations (USGEO) Annual Report and USGEO Near Term Opportunity Reports, (4) *A Multiyear Research and Program Management Plan for Particulate Matter - a Response to the NRC's Committee on Research Priorities for Airborne*

Particulate Matter's Report IV, and (5) CENR Toxics and Risk Subcommittee Charter.

SUBCOMMITTEE ON DISASTER REDUCTION

The OFCM has been an active participant in the work of the CENR Subcommittee on Disaster Reduction (SDR). SDR has developed Grand Challenges implementation plans, to improve the nation's capacity to prevent and recover from disasters. These disaster scenarios serve as a useful tool for sharing the ideas behind the 2005 SDR Grand Challenges document and demonstrating their possible application. The implementation plans include such topics as assessing disaster resilience, understanding the natural processes that produce hazards, promoting risk-wise behavior, etc. SDR has also completed a Windstorm Impact Reduction Implementation Plan which is the culmination of an SDR-led, coordinated federal effort, in cooperation with other levels of government, academia, and the private sector, to improve understanding of windstorms and their impact, and develop and encourage implementation of cost-effective mitigation measures to reduce those impacts while promoting community resilience. In addition, the SDR working group on satellite issues has participated in the creation of a waiver for the 24-hour wait period on high resolution commercial satellite imagery. The need of state and local governments as well as private entities to respond quickly in the aftermath of Hurricane Katrina and other natural disasters was the impetus behind the waiver request, which has been instituted domestically. OFCM is committed to working with SDR to provide a forum for information sharing, development of collaborative opportunities, and interactive dialogue with the U.S. policy community to advance informed strategies for managing risks associated with natural and technological disasters.

AMERICAN METEOROLOGICAL SOCIETY

During FY 2006, the OFCM joined in supporting the new 2006/2007 American Meteorological Society (AMS) Freshman Undergraduate Scholarship Program. The scholarship program is open to all high school students and designed to encourage study in the atmospheric and related sciences. The scholarships will be awarded, based on academic excellence, to high school seniors entering their freshman year of study in the atmospheric, oceanic, or hydrologic sciences. The scholarships are for the freshman and sophomore years, with second-year funding dependent on successful completion of the first year. The OFCM also supports AMS endeavors by participating in AMS conferences and workshops and other environmental science education and outreach programs, including for example the December 19-21, 2005, policy forum *Building America's Resilience to Hazards* held in Washington, D.C.; and the January 29 - February 2, 2006, 86th AMS Annual Meeting in Atlanta, Georgia, at which OFCM provided a presentation on Weather Information for Surface Transportation (WIST). In addition, an OFCM staff member is Chairperson of the AMS Weather Analysis and Forecasting Committee; Cochair of the 2007 AMS Annual Meeting to be held in San Antonio, Texas; and a member of the AMS Reichelderfer Award Committee.

INTERNATIONAL COLLABORATION

During FY 2005, the Federal Coordinator provided a comprehensive briefing on the OFCM and interagency coordination of federal meteorological activities to Dr. Xu Xiaofeng and a delegation of 25 individuals from the Chinese Meteorological Administration, on May 24, 2005. Then on August 24, 2005, the Federal Coordinator hosted and briefed Dr. Zheng Guoguang, Deputy Administrator of the Chinese Meteorological Administration. Also, news media from Japan attended and conducted interviews at the 59th Interdepartmental Hurricane Conference in Jacksonville, Florida, March 7-11, 2005. OFCM continued to participate in opportunities as they arose during FY 2006. The OFCM Committee for Environmental Information Systems and Communications (CEISC) and its Joint Action Group for XML and Web Services (JAG/XMLWS) prepared a U.S. position paper on the World Meteorological Organization's (WMO) development on guidance and practices for XML based representation and delivery of meteorological information which was presented at the meeting of the Expert Team on Data Representation and Codes (ET/DR&C) in Montreal, Canada, May 8-12, 2006. In the position paper, the U.S. supported the efforts of the ET/DR&C to develop XML guidance, practices, and any associated WMO standards for the representation and delivery of meteorological information; and noted that the U.S. has a substantial body of work to share with the ET/DR&C, and would like to be involved in all steps of the process.

PUBLICATIONS AND OFCM'S WEB SITE

The following publications were prepared in hardcopy form and/or have been placed on OFCM's Web site (www.ofcm.gov):

- *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2006*

- *National Winter Storms Operations Plan*

- *National Hurricane Operations*

Plan

• *Federal Research and Development Needs and Priorities for Phased Array Radar*

• *Report of the Assessment Committee for the National Space Weather Program*

• *Weather Information for Surface Transportation-Update on Weather Impacts and WIST Results*

• *Federal Meteorological Handbook No. 1-Surface Weather Observations and Reports*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part A-System Concepts, Responsibilities and Procedures*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part B-Doppler Radar Theory and Meteorology*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part D-WSR-88D Unit Description and Operational Analysis*

The following documents are planned for publication during FY 2007:

• *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2007*

• *Federal Meteorological Data Assimilation Capabilities*

• *National Hurricane Operations Plan*

• *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*

• *Strategic Plan for Improved Tropical Cyclone Reconnaissance Systems*

• *Criteria for Selection of Joint Urban Test Beds (JUTB)*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part C-WSR-88D Products and Algorithms*

During FY 2006, the OFCM continued to make substantial progress on its use of the Internet. In addition to information about the office, the OFCM has placed its current publications on its Web site, and keeps the Web site current with information regarding workshops and forums being conducted by the office. The OFCM will continue to make information available on the Internet during FY 2007.

Table A.1 Current OFCM Publications

Publication Title	Date	Number
Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 2006	*October 2005*	*FCM-P1-2005*
Urban Meteorology: Meeting Weather Needs in the Urban Community	*January 2004*	*FCM-R22-2004*
National Plan for Space Environment Services and Supporting Research: 1993-1997	August 1993	FCM-P10-1993
National Severe Local Storms Operations Plan	*May 2001*	*FCM-P11-2001*
National Hurricane Operations Plan *WSR-88D Tropical Cyclone Operations Plan*	*May 2006*	*FCM-P12-2006*
National Winter Storms Operations Plan	*December 2005*	*FCM-P13-2005*
Federal Plan for Cooperative Support and Backup Among Operational Processing Centers	Nov 2002	FCM-P14-2002
National Plan for Stratospheric Monitoring, 1988-1997	July 1989	FCM-P17-1989
National Aircraft Icing Technology Plan	April 1986	FCM-P20-1986
National Plan to Improve Aircraft Icing Forecasts	July 1986	FCM-P21-1986
Federal Plan for the Coordination of Automated Weather Information System Programs	May 1988	FCM-P23-1988
Federal Plan for Meteorological Information Management	July 1991	FCM-P24-1991
National Plan for Tropical Cyclone Research and Reconnaissance (1997-2002)	*January 1997*	*FCM-P25-1997*
National Aviation Weather Program Plan	September 1992	FCM-P27-1992
National Geostationary Operational Environmental Satellite (GOES) Data Collection System (DCS) Operations Plan	August 1997	FCM-P28-1997
Federal Plan for Marine Environmental Data, Services, and Supporting Research	June 1996	FCM-P29-1996
The National Space Weather Program: Strategic Plan	*August 1995*	*FCM-P30-1995*
The National Space Weather Program: Implementation Plan - 2nd Edition	*July 2000*	*FCM-P31-2000*
National Aviation Weather Strategic Plan	*April 1997*	*FCM-P32-1997*
National Post-Storm Data Acquisition Plan	*March 2003*	*FCM-P33-2003*
National Aviation Weather Initiatives	*February 1999*	*FCM-P34-1999*
National Aviation Weather Initiatives, Final Baseline Tier 3 and 4 Report	April 2001	Unnumbered
National Aviation Weather Program/Projects (Tier 3/4 Baseline Update)	December 2003	FCM-R21-2003
Federal Meteorological Handbook No. 1 - Surface Weather Observations and Reports	*September 2005*	*FCM-H1-2005*

Table A.1 Current OFCM Publications (cont.)

Publication Title	Date	Number
Federal Meteorological Handbook No. 2 - Surface Synoptic Codes	December 1988	FCM-H2-1988
Surface Synoptic Code Tables (Update)	July 1990	FCM-T1-1990
Federal Meteorological Handbook No. 3 - Rawinsonde and Pibal Observations	*May 1997*	*FCM-H3-1997*
Federal Meteorological Handbook No. 10 - Meteorological Rocket Observations	December 1988	FCM-H10-1988
Federal Meteorological Handbook No. 11 - Doppler Radar Meteorological Observations		
Part A - System Concepts, Responsibilities and Procedures	*April 2006*	*FCM-H11A-2006*
Part B - Doppler Radar Theory and Meteorology	*December 2005*	*FCM-H11B-2005*
Part C - WSR-88D Products and Algorithms	February 1991	FCM-H11C-1991
Part D - WSR-88D Unit Description and Operational Analysis	*February 2006*	*FCM-H11D-2006*
Federal Meteorological Handbook No. 12 - United States Meteorological Codes and Coding Practices	*December 1998*	*FCM-H12-1998*
Directory of Atmospheric Transport and Diffusion Consequence Assessment Models	*March 1999*	*FCM-I3-1999*
Federal Directory of Mobile Meteorological Equipment and Capabilities	*December 1995*	*FCM-I5-1995*
A Guide to WMO Code Form FM 94 BUFR	*March 1995*	*FCM-I6-1995*
Tropical Cyclone Studies	December 1988	FCM-R11-1988
Tropical Cyclone Studies Supplement	August 1989	FCM-R11-1988S
Interdepartmental Meteorological Data Exchange System Report, IMDES	*August 1998*	*FCM-R12-1998*
Federal Meteorological Requirements 2000	October 1990	FCM-R13-1990
U.S. Wind Profiler: A Review	*March 1998*	*FCM-R14-1998*
Atmospheric Modeling of Releases from Weapons of Mass Destruction	August 2002	FCM-R17-2002
Weather Information for Surface Transportation--National Needs Assessment Report	*December 2002*	*FCM-R18-2002*
Report on Wind Chill Temperature and Extreme Heat Indices: Evaluation and Improvement Projects	*January 2003*	*FCM-R19-2003*
National Aviation Weather Program Mid-Course Assessment	*August 2003*	*FCN-R20-2003*
Standard Formats for Weather Data Exchange Among Automated Weather Information Systems	November 1994	FCM-S2-1994
Standard Telecommunication Procedures for Weather Data Exchange (under revision)	October 1991	FCM-S3-1991
Federal Standard for Siting Meteorological Sensors at Airports	*August 1994*	*FCM-S4-1994*
Proceedings of the Workshop on Multiscale Atmospheric Dispersion Modeling within the Federal Community	*June 2000*	
Proceedings of the Aviation Weather User Forum--Aviation Weather: Opportunities for Implementation	*July 2000*	

Table A.1 Current OFCM Publications (cont.)

Publication Title	Date	Number
Proceedings for the Symposium on Weather Information for Surface Transportation: Delivering Improved Safety and Efficiency for Tomorrow	*February 2000*	
Proceedings of the Symposium on Weather Information for Surface Transportation -- Preparing for the Future: Improved Weather Information for Decision Makers	*March 2001*	
Proceedings of the Forum on Risk Management and Assessment of Natural Hazards	*July 2001*	
Proceedings of the Workshop on Strategy for Providing Atmospheric Information	*March 2002*	
Aviation Weather Training: A Report on Training for Emerging and Recently Implemented Aviation Weather Programs	*April 2002*	*FCM-R16-2002*
Proceedings of the Workshop on Effective Emergency Response	*May 2002*	
Federal Research and Development Needs and Priorities for Atmospheric Transport and Diffusion Modeling	*September 2004*	*FCM-R23-2004*
Aviation Weather Programs/Projects-2004 Update (Tier ¾ Baseline Update)	*December 2004*	*FCM-R21-2004*
Proceedings of the 2nd International Conference on Volcanic Ash and Aviation Safety	*November 2004*	
Proceedings of the User Forum on Urban Meteorology	*March 2005*	
Federal Research and Development Needs and Priorities for Phased Array Radar	*June 2006*	*FCM-R25-2006*
Report of the Assessment Committee for the National Space Weather Program	*June 2006*	*FCM-R24-2006*
Weather Information for Surface Transportation - Update on Weather Impacts and WIST Results	*August 2006*	*FCM-R26-2006*

Italics = publication available online at *www.ofcm.gov*